

Mycotoxin contamination of cereal grain commodities in relation to climate in North West Europe

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Year: 2012
Journal: Food Additives & Contaminants. Part A, Chemistry, Analysis, Control, Exposure & Risk Assessment. 29 (10): 1581-1592

Abstract:

This study aimed to investigate mycotoxin contamination of cereal grain commodities for feed and food production in North Western Europe during the last two decades, including trends over time and co-occurrence between toxins, and to assess possible effects of climate on the presence of mycotoxins. For these aims, analytical results related to mycotoxin contamination of cereal grain commodities, collected in the course of national monitoring programmes in Finland, Sweden, Norway and the Netherlands during a 20-year period, were gathered. Historical observational weather data, including daily relative humidity, rainfall and temperature, were obtained from each of these four countries. In total 6382 records, referring to individual sample results for mycotoxin concentrations (one or more toxins) in cereal grains were available. Most records referred to wheat, barley, maize and oats. The most frequently analysed mycotoxins were deoxynivalenol, 3-acetyl-deoxynivalenol, nivalenol, T-2 toxin, HT-2 toxin and zearalenone. Deoxynivalenol had the highest overall incidence of 46%, and was mainly found in wheat, maize and oats. Mycotoxins that showed co-occurrence were: deoxynivalenol and 3-acetyl-deoxynivalenol in oats; deoxynivalenol and zearalenone in maize and wheat; and T-2 toxin and HT-2 toxin in oats. The presence of both deoxynivalenol and zearalenone in wheat increased with higher temperatures, relative humidity and rainfall during cultivation, but the presence of nivalenol was negatively associated with most of these climatic factors. The same holds for both nivalenol and deoxynivalenol in oats. This implies that climatic conditions that are conducive for one toxin may have a decreasing effect on the other. The presence of HT-2 toxin in oats showed a slight decreasing trends over time, but significant trends for other toxins showed an increasing presence during the last two decades. It is therefore useful to continue monitoring of mycotoxins. Obtained results can be used for development of predictive models for presence of mycotoxins in cereal grains.

Source: <http://dx.doi.org/10.1080/19440049.2012.689996>

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Quality

Food/Water Quality: Biotoxin/Algal Bloom

Geographic Feature:

Climate Change and Human Health Literature Portal



resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Region

Other European Region: Northwestern Europe

Health Impact:

specification of health effect or disease related to climate change exposure

Other Health Impact

Other Health Impact: mycotoxins

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified